The Thesis Committee for Jennifer Marie Barton
Certifies that this is the approved version of the following Thesis:

Parents' Behavioral Intentions to Improve Child Dietary Intake and Physical Activity Levels: The Mediating Role of Parents' Ability to Enact Change

APPROVED BY
SUPERVISING COMMITTEE:

Deborah Jacobvitz, Supervisor

Nancy Hazen-Swann

Jody S. Nicholson

Parents' Behavioral Intentions to Improve Child Dietary Intake and Physical Activity Levels: The Mediating Role of Parents' Ability to Enact Change

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Jennifer Marie Barton

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Dedication

I dedicate this thesis to my parents, Donna and Robert, without whom the completion of this work would not have been possible without their patience, support, and encouragement.

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Abstract

Parents' Behavioral Intentions to Improve Child Dietary Intake and Physical Activity Levels: The Mediating Role of Parents' Ability to Enact Change

Jennifer Marie Barton, M.A.
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Supervisor: Deborah Jacobvitz

The present study investigated several pathways of a new theoretical model for understanding how parents engage in health behavior change related to their child's health. Specifically, the present study examined the independent effects of parents' nutrition knowledge, stress and child body mass index on parents' intentions to change their child's dietary intake and physical activity, through a mediating factor, the ability to enact change (i.e., self-efficacy, self-control, support from coparent), that may explain the relationship between nutrition knowledge and stress on parents' intentions. In addition, parents' feeding style (e.g., authoritative vs authoritarian) was examined as a moderator of the relationship between parents' ability to enact change and their intentions. Participants were a sample of 329 parents (M_{age} = 33.84, SD_{age} = 5.68) of children ages 3 to 8 years. Results from a path analysis in a structural equation modeling framework indicate that parents' stress negatively affects perceptions of their ability to enact change but positively influences their intentions to change their child's physical activity levels. Moreover, parents with an overweight or obese child were more inclined to have intentions to change their child's dietary intake and physical activity levels. Nutrition knowledge was largely unrelated to the constructs of interest. No significant indirect effects emerged using parents' ability to enact change and moderation analyses revealed no difference in the strength of the relationship between parents' ability to enact change and their intentions by parents' feeding style. These findings suggest that contextual factors, such as parents' perceived stress, is an important factor to consider to understand parents perceived abilities as well as their intentions to change.

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Introduction

A recent report indicates that roughly 18.5% of all US children ages 2 to 19 were overweight or obese (Hales, Carroll, Fryar, & Ogden, 2017). When considering obesity by age group, rates are lowest for children ages 2 to 5 (13.9%) compared to 18.4% of 6 to 11-year olds and 20.6% of 12 to 19-year olds. Childhood obesity is linked to a host of physical diseases and psychological problems such as diabetes, hypertension, high cholesterol, metabolic syndrome (Sinha et al., 2002; Weiss et al., 2004), internalizing symptoms, and externalizing symptoms (Schwimmer, Burwinkle, & Varni, 2003). A recent meta-analysis suggests that obesity trends persist well into adulthood, such that obese school-aged children are likely to become obese adolescents and subsequently obese adults (Simmonds, Llewellyn, Owen, & Woolacott, 2016). Early and middle childhood may be an optimal developmental period for prevention effort, but also intervention if necessary. However, instead of targeting children themselves, previous research suggests that parents are instrumental in promoting child health (Andrews, Silk, & Eneli, 2010).

The present study will focus on testing part of a new theoretical model that incorporates developmental theories of parenting with existing theories of health behavior change. Specifically, the present study will focus on several pathways: the association of stress and nutrition knowledge on parents' intentions for changing their child's dietary intake and physical activity levels (note: nutrition knowledge will not be used as a predictor of physical activity intentions) through parents' abilities to enact change (i.e., parental self-efficacy, self-control, and support from coparent). Developmental theorists have long emphasized the importance of parents on child development (Bornstein, 2006). For example, Bronfenbrenner (1977) described human development from an ecological perspective, with parents exerting their influence at a proximal level (Bronfenbrenner & Morris, 1998, 2006), while Belsky (1984) expanded on specific influences (i.e., stress and support) of parenting on child well-being. Alternatively, health behavior theorists have focused on factors that facilitate or impede individuals from engaging in behavior change and maintenance. To date, six models are commonly used to study health behavior change: the Health Belief Model (Hochbaum, 1958; Rosenstock, 1960, 1974), the Theory of Reasoned Action (Fishbein, 1967; Fishbein & Ajzen, 1975), the Theory of Planned Behavior (Ajzen, 1985, 1991), the Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992), the Precaution Adoption Process Model (Weinstein, 1988; Weinstein & Sandman, 1992), and the Health Action Process Approach (Schwarzer, 2008). However, none of the current health behavior models captures the complexity of influences on child health. Theoretical unification between developmental and health science is necessary for understanding how parents affect child health outcomes.

The primary goal of the present study was to highlight the role of parents' ability to promote the healthy weight status in their children. More specifically, I assess parents' knowledge of nutrition, stress, their ability to enact change (e.g., parental self-efficacy, self-control/regulation, support from coparent), and their intentions for changing their child's dietary intake and physical activity levels. The majority of research has focused on parents' behaviors or child outcomes, rather than parents' intentions. For example, parents’ nutrition knowledge has been linked child fat consumption (Colavito, Guthrie, Hertzler, & Webb, 1996), while stress has been linked to parental self-efficacy (Gross, Fogg, & Tucker, 1995; Fox & Gelfand, 1994; Scheel & Rieckmann, 1998), self-control/regulation (Muraven & Baumeister, 2000), and the coparenting relationship (see McDaniel, Teti, & Feinberg, 2018). With regard to perceived abilities, self-efficacy (Parekh et al., 2018), self-control/regulation (Pelletier, Dion, Slovinec-D’Angleo, & Reid, 2004), and support (Povey, Conner, Sparks, James, & Shepherd, 2000) have been independently linked to positive changes in individual or child dietary intake. Although studies have identified links between these primary predictors and subsequent behavior, few have investigated intentions within the parent population.

A second goal of the present study is to determine whether parents’ ability to enact change mediates the relation between nutrition knowledge and stress on parents’ intentions to change their child’s dietary intake and physical activity levels. In line with health behavior theories, knowledge or awareness of topic should be associated with an individuals’ abilities (i.e., perceived behavioral control), and in turn associated with an individuals’ intention to change (Ajzen, 1985, 1991). Theories of parenting suggest that stress may negatively influence parents’ competency (e.g., Belsky, 1984; Bronfenbrenner, 1977; Bronfenbrenner & Morris, 1998, 2006), but little is known about the relation between parents’ stress, perceived abilities, and intentions to change their behaviors. This second goal reflects the necessity for combining developmental and health theories to further understand the influence of parents in determining child health.

A third goal of the present study is to determine whether parent feeding styles during meal times (i.e., authoritative, authoritarian, permissive, indulgent) moderates the relation between parents' ability to enact change and parents' intentions to change their child's dietary intake. There is evidence to suggest that parent feeding styles may influence parental self-efficacy (Gevers, Assema, de Vries, & Kremers, 2017) and their dietary behaviors (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2012), yet few studies have examined whether these parenting behaviors affect the association between parents' perceived abilities and parents' intentions to change what they feed their children. The full conceptual model is illustrated in Figure 1.

Behavioral Intentions

Behavioral intention is used as an intermediate outcome (and predictor) in the Theory of Planned Behavior (Ajzen, 1985, 1991), the Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992), and the Health Action Process Approach (Schwarzer, 2008). Often, behavioral intention is defined as what an individual plans to do, which in turn should be linked to actual behavior (Ajzen, 1991; Ajzen, 1992; Fishbein & Ajzen, 1975). The Theory of Planned Behavior (Ajzen, 1985, 1991) posits that attitudes, norms, and perceived behavioral control are determinants of behavioral intentions, while intention reflects stages in the Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992) and the Health Action Process Approach (Schwarzer, 2008).

To date, over 2,000 meta-analyses and/or review articles have been published on intentions and various health behaviors. In regard to dietary behaviors, a survey of the literature suggests intention is a common predictor of behavior (Riebl et al., 2015), with an average effect size of r = .45-.47 (McDermott et al., 2015a; McDermott et al., 2015b). Further, a synthesis of the physical activity literature suggests that 42% of “behavior intenders” carry out the behavior (Rhodes & de Bruijn, 2013), while experimental evidence for the intention-behavior association indicate a moderate relation r = .51 (Rhodes & Dickau, 2012). These moderate associations suggest that intentions do not always lead to action, for a variety of reasons including depletion of psychological resources (Gollwitzer & Sheeran, 2006).

Perhaps of most importance, these effect sizes do not reflect the parent-to-child population, but rather individuals engaging in behavior change for their own health. Young children may be unable to engage in health behavior change themselves due to their cognitive development (Killgore & Yurgelun-Todd, 2005), knowledge in the given topic (Spruijt-Metz, 1999), and lack of autonomy within their environment (Lindsay, Sussner, Kim, & Gortmaker, 2006). Thus, it is important to consider the role that parents play in determining their child’s physical health. However, little research has focused on empirically examining parents’ intentions for changing their child’s dietary intake and physical activity levels. A literature search of obesity prevention studies targeting parents was conducted to determine whether parents’ intentions were linked to nutrition knowledge, stress, parental self-efficacy, self-control/regulation, and social support. Of the articles identified, knowledge was commonly assessed alongside intentions, but the direct association between the two constructs was not examined (Hart, Damiano, & Paxton, 2016; Mareno, 2014; Sweitzer, Briley, Roberts-Gray, Hoelscher, Harrist, Staskel,

& Almansour, 2011). The direct association between parental self-efficacy and parents' intentions was examined in one study (Shriver, Hildebrand, & Austin, 2010), while perceived behavioral control was measured alongside intentions in an additional study (Sweitzer et al., 2011). However, measures of parents' stress and support were largely ignored. This evidence suggests that studies focused on parents' intentions may not consider contextual factors, such as stress and support, in determining parents' intentions to change their child's dietary intake and physical activity levels.

Health behavior change studies focusing on parents' behaviors may be ignoring the unique factors parents face when considering child health. Although unrelated to childhood obesity, Amin & Harrison (2009) postulated that no present health behavior change model had captured the complexity of parenting on child oral health. This issue prompted the authors to review the existing literature for patterns that emerged on health behavior change processes for parents, which resulted in a four-layer contextual model of health behavior change for parents. Similar to Amin & Harrison (2009), the goal of the present study is to understand the role of parents in determining child weight outcomes and building a comprehensive model to test and understand the links between parent's attitudes, beliefs, and intentions toward healthful behaviors.

Nutrition Knowledge on Perceived Abilities and Intentions

Domain-specific knowledge or awareness is used as a modifying factor in the Health Belief Model (Hochbaum, 1958; Rosenstock, 1960, 1974), as a predictor of attitudes, norms and perceived behavioral control in the Theory of Planned Behavior (Ajzen, 1985, 1991), and as a stage of change in the Precaution Adoption Process Model

(Weinstein, 1988; Weinstein & Sandman, 1992). Ajzen (1991) postulated that knowledge is necessary for an individual to develop attitudes, subjective norms, and perceived behavioral control. Thus, knowledge or awareness of the topic (or issue) is required to predict or modify individuals' attitudes, norms, and perceived behavioral control. Given the topic of childhood obesity, the present study will focus on the effect of nutrition knowledge on parents' intentions to change their child's dietary intake through parents perceived behavioral control, which will be modeled as a latent variable using parental self-efficacy, self-control, and support from coparent.

Nutrition knowledge is defined as the concepts and processes related to nutrition and health including diet, disease, nutrients, and dietary guidelines and recommendations (Axelson & Brinberg, 1992; McKinnon, Giskes, & Turrell, 2014; Moorman, 1996; Parmenter & Wardle, 1999). Previous research has been surrounding nutrition knowledge has largely focused on dietary intake (Spronk, Kullen, Burdon, & O'Connor, 2014). For example, some nutrition education programs have been successful at changing dietary behaviors through increasing nutrition knowledge (Howard-Pitney, Winkleby, Albright, Bruce, & Fortmann, 1997; Klohe-Lehman et al., 2006). Others have demonstrated strong links between nutrition knowledge and increased fruit and vegetable intake (De Vriendt, Matthys, Verbeke, Pynaert, & De Henauw, 2009), while others have identified weaker associations (Sapp & Jensen, 1997; Shepherd & Towler, 1992; Wardle, Parmenter, & Waller, 2000).Nutrition knowledge should increase the likelihood that an individual will make healthy food decisions, but knowledge does not always lead to healthy decisions (Cotugna et al., 1992; Sapp and Jensen, 1997). There is some evidence to suggest that nutrition knowledge is related to self-efficacy for food-related behaviors (see Rabiei, Sharifirad, Azadbakht, & Hassanzadeh, 2013), but it is important to note that these findings do not reflect the parent population.

Within the framework of health behavior change, less is known about the link between parents' nutrition knowledge and intentions to change their child's diet intake. Though limited, previous research on parents' nutrition knowledge has mostly focused on what parents feed their children – thus, bypassing the stage of having intentions to change their behavior. The existing literature suggests that parents' knowledge of nutrition influences child diet to some extent (Peters, Dollman, Petkov, & Parletta, 2012). For example, children of parents who meal plan and have more nutrition knowledge ate less fat than their counterparts (Colavito, Guthrie, Hertzler, & Webb, 1996). However, other studies have demonstrated no significant differences between parents of healthy weight children and overweight children on their knowledge of nutrition (e.g., Etelson, Brand, Patrick, & Shirali, 2003; Hudson, Craig Stotts, Pruett, & Cowan, 2005). This evidence suggests that parents of healthy and overweight children may have similar levels of nutrition knowledge but how parents employ their knowledge may vary.

Stress on Perceived Abilities and Intentions

The context in which families are embedded in can influence the manner in which parents interact with their children (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 1998, 2006). Belsky (1984) echoed this notion with the Determinants of Parenting model, which posits that contextual sources of stress and support affect parents' behavior. Stress can broadly be defined as any environmental stimuli that disrupts homeostasis, or the body’s’ resting state (Monroe & Cummins, 2015). Common stressors that parents may encounter include financial, such as income, and social, such as occupational status and marital problems (Laible & Eye, 2012). Previous research suggests that these stressors negatively affect how parents interact with their children. For example, parents who experience high levels of stress may engage in greater levels of harsh parenting.

Perceptions of stress have been shown to influence parenting generally (Laible & Eye, 2012), but stress may also impede parents’ abilities to enact change such as parental self-efficacy, self-control/regulation, and support from coparent. Parents’ feelings of competency, such as self-efficacy, may be negatively affected by stress. Maternal stress has been linked to lower parental self-efficacy and less effective parenting (Fox & Gelfand, 1994). Alternatively, lower levels of stress have been linked to increased parental self-efficacy (Gross et al., 1995; Scheel & Rieckmann, 1998). Stress has also been linked to self-control/regulation performance. Self-control/regulation resources become depleted in order to cope with stressors, which results in poorer self-control/regulation performance (Muraven & Baumeister, 2000). Individuals who perform better on self-control/regulation tasks tend to report lower levels of stress. Feelings of stress may also affect the perception of support received from a coparent (see McDaniel, Teti, & Feinberg, 2018). For example, marital distress has been linked to less harmonious coparenting (McHale, 1995), while general distress is associated with less supportive coparenting (see McDaniel, Teti, & Feinberg, 2018). This evidence suggests that stress can influence individuals’ ability to enact change, specifically by affecting their feelings of competency, their ability to regulate behavior, and their coparenting relationship.

Similar to parents' nutrition knowledge, little is known about the link between parents' stress and intentions to change their child's diet intake. However, previous research suggests that stress negatively affects motivation, confidence in behavior change, as well as the actual behavior change (see Marzec, Lee, Cornwell, Burton, McMullen, & Edington, 2013). For example, greater levels of stress may inhibit individuals from exercising, eating healthy, and drive safely (Padden, Connors, & Agazio, 2011). However, greater levels of stress have also been linked to having greater intentions to change behaviors (Marzec et al., 2013). A possible explanation is that feelings of stress may alert an individual that there is a problem, which results in wanting to change their health behavior. This evidence is perplexing because stress has also been linked to impeding successful health behavior change. However, it is important to note that these findings do not reflect the parent-to-child population, but rather individuals engaging in behavior change for their own health.

Ability to Enact Change on Intentions

Parental self-efficacy. Self-efficacy, or perceived behavioral control, is the most common predictor across the existing models of health behavior change (i.e., Health Belief Model, Theory of Planned Behavior, Transtheoretical Model, and Health Action Process Approach). Parental self-efficacy can be broadly defined as the expectation caregivers hold about their ability to parent successfully, as well as influence their children's behavior and development (Coleman & Karraker, 2000; Jones & Prinz, 2005). Efficacious parents may be more likely to engage in positive parenting strategies perceive problems as challenges rather than barriers, exhibit less emotional arousal, and are more involved with their children (see Green, Walker, Hoover-Dempsey, & Sandler, 2007; Jerusalem & Mittag, 1995). Alternatively, less efficacious parents may struggle with engaging in positive parenting strategies and may not persist when challenges arise. Within the context of feeding, parents with greater efficacy tend to feed their children higher quality food, fewer unhealthy snacks (Parekh et al., 2018), fewer sugary drinks (Wright, Adams, Laforge, Berry, & Friedman, 2014), and increased fruit and vegetable intake (Ice, Neal, & Cottrell, 2014).

Multiple meta-analyses have examined the effect of self-efficacy on health-related intentions, which suggests an overall average effect size of $r = .51$ (see Sheeran et al., 2016). However, the studies included in this meta-analysis are not specific to dietary intake and physical activity nor do they reflect the parent population. A qualitative analysis identified key themes related to parents' child-feeding behaviors and attitudes within the Theory of Planned Behavior (Ajzen, 1985, 1991; Duncanson, Burrows, Holman, & Collin, 2013). With regard to parents' intentions, the authors suggest that efficacious parents who have a high degree of control over child feeding may be more likely to have intentions to change what and how they feed their children. However, little research has focused on the role of parental self-efficacy on their intentions to change their child's dietary intake and physical activity, but rather their actual behavior (e.g., what they feed their child, how their children spend their time).

Self-control/regulation. The goal pursuit literature has long emphasized the importance of self-regulatory processes, such as self-control, for goal attainment (see Neal, Ballard, & Vancouver, 2017). The terms "self-control" and "self-regulation" are often used synonymously to describe the process by which individuals alter or override their initial responses to support the pursuit of long-term goals (Baumeister, Vohs, & Tice, 2007). The ability of self-control/regulation operates on a finite source of energy, and when this resource is depleted, it becomes difficult to carry out tasks (Baumeister, Heatherton, & Tice, 1994). Behavioral theories, such as Social Cognitive Theory (Bandura, 1997), have highlighted the importance of self-control/regulation in determining health outcomes. For example, self-control/regulation has been linked to consuming breakfast (Wong & Mullan, 2009), sleep hygiene (Todd & Mullan, 2012), binge drinking (Mullan, Wong, Allom, & Pack, 2011) and consuming fruits and vegetables (Allom & Mullan, 2012).

Within the obesity literature, self-control/regulation has been linked to healthier dietary intake (Pelletier, Dion, Slovinec-D'Angleo, & Reid, 2004) and increased intake of healthy fat, fiber, and fruit and vegetable intake (Ammerman, Lindquist, Lohr, & Hersey, 2002; Grossarth-Maticek & Eysenck, 1995; Pelletier et al., 2004; Schnoll & Zimmerman, 2001; Vartanian, Herman, & Polivy, 2006). Prior research suggests that self-control/regulation may play a role in explaining the intention-to-behavior gap (see Mullan, Allom, Brogan, Kothe, & Todd, 2014). Specifically, self-control/regulation processes, namely inhibition and planning ability, have been linked to changes in fruit and vegetable intake (Hall, Fong, Epp, & Elias, 2008) and breakfast consumption (Wong & Mullan, 2009), as well as moderating the association between intentions and later behavior. However, few studies have examined the association between self-control/regulation on dietary intake and physical activity intentions, while even fewer studies have assessed the links within the parent population. Thus, parents' self-control/regulation may be a determinant of their intentions to change their child's dietary intake and physical activity.

Support from coparent. Generally, social support may be an important component for encouraging individuals to set and maintain their health behaviors (Webb & Sheeran, 2006). Health behavior change programs have utilized social support as an incentive to boost individuals' commitment and subsequent behaviors. For example, social support and encouragement has been linked to goal attainment for dietary intake (Povey, Conner, Sparks, James, & Shepherd, 2000). However, in the context of parenting, it is important to consider the support parents perceive from their coparent. Coparent support is broadly defined as the positive endorsement of one's parenting competency, giving support to the coparent in times of stress, and recognition of the coparents' achievements in parenting (Abidin & Brunner, 1995). Alternatively, parents may feel that their coparent is undermining their parenting through the use of criticism, disparagement, and blame (Belsky, Woodworth, & Crnic, 1996; McHale, 1995; Weissman & Cohen, 1985). Previous research suggests that coparent support and undermining is associated with stress, parental self-efficacy, and parenting quality (see Feinberg, Brown, & Kan, 2012).

A recent review of parenting and child obesogenic behaviors emphasized the lack of research on the relationship between parents (Patrick, Hennessy, McSpadden, & Oh, 2013). The majority of research on parenting within the child obesity literature has focused on one parent rather than how dyads of parents affect child weight status.

Previous research suggests that mothers and fathers may differentially affect child weight. Specifically, adolescents with authoritative mothers had a lower body mass index (BMI) (Berge, Wall, Loth, & Neumark-Sztainer, 2010), while preschoolers with permissive fathers had higher BMI's (Wake, Nicholson, Hardy, & Smith, 2007). This evidence suggests that it is important to consider how parents work together to engage in behaviors to affect their child's health. If two parents prioritize similar health goals, it is likely they will behave in a supportive manner towards their coparent. Whereas, if two parents do not prioritize similar health goals, it is likely one parent will feel undermined by their coparent. Unfortunately, coparenting has been largely ignored in the child health literature, especially within a health behavior change framework.

Child Body Mass Index on Intentions

Parents may be more inclined to set intentions to change their child's dietary intake and physical activity if they perceive their child as being overweight or obese. However, evidence suggests that parents may hold misperceptions about their child's weight status (see Eckstein, Mikhail, Ariza, Thomson, Millard, & Binns, 2006). Roughly 32% of mothers considered their overweight child to be "about the right weight" (Maynard, Galuska, Blanck, & Serdula, 2003), whereas 21% of mothers correctly identified their child as overweight (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000). This misperception may lead parents to have low intentions to change their child's dietary intake or physical activity levels. However, parents who acknowledge their child's overweight status have greater intentions to change their behaviors (Park, Falconer, Croker, Saxena, Kessel, Viner, & Kinra, 2014; Rhee, De

Lago, Arscott-Mills, & Mehta, 2005). It may be important to consider the effect of child BMI on parents' intentions rather than perceptions of their child's weight.

Moderating Effect of Parent Feeding Styles

General parenting style has also been linked to the development of childhood obesity (Berge, 2009). Parenting style is assessed based on levels of responsiveness/nurturance and demandingness/control that a parent exerts towards their child (Johnston & Mash, 1989). Responsiveness has been defined as the extent to which parents are warm, accepting, and involved with their child, while demandingness refers to the parents' level of control and supervision within a given context (Maccoby & Martin, 1983). Hughes & colleagues (2005) developed a domain-specific measure to assess parenting style during meal times. Within the feeding context, demandingness refers to the amount of demands placed on the child to get them to eat, while responsiveness has been defined as how the parent carries out the demands. By combining these two dimensions, four parent feeding styles can be found: authoritative (high in both dimensions), authoritarian (low responsiveness/high demandingness), permissive/indulgent (high responsiveness/low demandingness), and uninvolved (low in both dimensions). Children with permissive and uninvolved parents tend to have higher BMI's, compared to children with authoritative or authoritarian parents (Vollmer & Mobley, 2013).

Parent feeding styles have been independently linked to parental self-efficacy (Gevers et al., 2017) as well as their dietary behaviors (Hennessy et al., 2012). Parents with greater self-efficacy tend to be more supportive and involved with their children during meal times (Gevers et al., 2017), while permissive parents tend to feed their children low nutrient foods (Hennessy et al., 2012). However, less is known about how parent feeding styles moderates the relation between parents' abilities (i.e., parental self-efficacy, self-control/regulation, and support from coparent) on parents' intentions to change their child's dietary intake. It could be argued that parents who have greater abilities may indicate having stronger intentions to change their behaviors. This association may be further strengthened if the parent engages in more positive parenting behaviors during meal times, such as having an authoritative feeding style. Alternatively, this association may be weakened if the parent engages in less positive parenting behaviors during meal times, such as authoritarian, permissive/indulgent, or uninvolved styles.

The Present Study

The proposed model for the present study is shown in Figure 1. I examine both the direct and indirect influence of parents' nutrition knowledge and stress on their behavioral intentions through the ability to enact change. The placement of constructs within this model is both research and theory-driven. Existing models of health behavior change, such as Theory of Planned Behavior (Ajzen, 1985, 1991), suggest that knowledge of a behavior and psychosocial factors are determinants of attitudes, norms, and perceived behavioral control, and in turn, attitudes, norms, and perceived behavioral control predict intentions. Therefore, I hypothesize that parents with greater nutrition knowledge will indicate greater abilities to enact change (i.e., parental self-efficacy, self-control, support from coparent) and greater intentions to change their child's dietary intake, while parents with greater stress may indicate having weaker abilities to enact change but indicate greater intentions to change their child's dietary intake. In turn, I hypothesize that parents with greater abilities to enact change may indicate they have stronger intentions to change their child' dietary intake and physical activity levels. Parents' intentions may also vary based on their child's weight status, such that parents with overweight or obese children may have greater intentions to change their behaviors. Last, the association between parents' ability to enact change and intentions to change their child's dietary intake may be moderated by the strategies parents employ during meal times. Thus, I hypothesize that the link between parents' ability to enact change and intentions to change their child's dietary intake will be moderated by parents' feeding styles, such that parents with an authoritative style will demonstrate a more robust, positive association.

Method

Participants

Participants were 329 parents (246 women, 83 men) recruited from Amazon's Mechanical Turk using Turk Prime. To be eligible for inclusion, all parents must have at least one child between the ages 3 and 8 years. Parents of children between the ages 3 and 8 were targeted due to broader research questions related to how parent's dietary practices vary as children age from early to middle childhood. Participants' ages ranged from 21 to 54 years (M = 33.84, SD = 5.68). Varying ethnicities were reported with 78% Caucasian/White, 7% African American, 6% Asian American, 6% Hispanic/Latino, 3% Multi-ethnic, .3% Native American/Alaska Native, and .3% identified as "Other". Thirty-seven percent of participants held a Bachelor's degree and 75% identified as married. Participants reported information about their children who were 52% male (n = 171) with an average age of 5.10 (SD = 1.74). Table 1 provides descriptive information on the study participants and their children.

Procedure

Turk Prime, a researcher-generated tool, was used to target Amazon Mechanical Turk (Mturk) workers who were parents of young children (3 to 8 years of age). To be eligible for inclusion, parents must be at least 18 years of age, be able to complete the survey in English, and living in the United States. Mturk is an online crowdsourcing tool used to match paid tasks with appropriate participants and has been successfully used in psychological research (e.g., Buhrmester, Kwang, & Gosling, 2011). First, a notification was sent to eligible parents briefly explaining the purpose of the study, and workers voluntarily elected to participate in a quick screening survey. In the screening survey, parents indicated the number of children they had and the ages of their children. Parents were approved for the main survey if they had at least one child aged 3 to 8 years. Next, a second notification was sent to the approved parents briefly reiterating the purpose of the study, and workers voluntarily elected to participant in the survey.

In order to participate in the survey, participants logged on to the Mturk website using a personal computer at a time and place of their choosing. After participants accepted the HIT (human intelligence task) and clicked on the survey link, participants were assigned an anonymous ID, which was used to track participant responses. When participants entered the survey, they were presented an informed consent form containing additional study information, participant rights, and appropriate contact information. Participants completed a series of self-report measures assessing their self-efficacy, parent feeding styles, child dietary intake, child characteristics, and demographic information. After completing the survey questions, participants were thanked, debriefed, and received a secret code to retrieve compensation. All participants were compensated $3 for their participation.

Measures

Stress. Participants completed the Perceived Stress Survey (Cohen, Kamack, & Mermelstein, 1983) to assess global perceived stress. The self-report scale includes 14 items using 0 (Never) to 4 (Very Often) rating scale and measures seven positive (e.g., "*How often have you dealt successfully with irritating life hassles?*") and seven negative (e.g., "*How often have you been upset because of something that happened* *unexpectedly?*") statements. The seven positive items were reverse-scored and a total score was created by calculating the mean across all items. Higher mean scores denote greater self-control, and the full scale demonstrated good reliability (α = .91).

Nutrition knowledge. Participants completed the Consumer Nutrition Knowledge Scale (Dickson-Spillman, Siegrist, & Keller, 2011) to assess general awareness of healthful diets. The self-report scale includes 20 items using True (e.g., "*Bacon contains more calories than ham*"), False (e.g., "*Fat is always bad for your health; you should therefore avoid it as much as possible*"), or Don't Know responses (17 False, 3 True). Correct responses were coded as 1 and incorrect or "don't know" responses were coded as 0. A total score was created by summing the correct responses across all items. Higher scores denote greater nutrition knowledge and the full scale demonstrated good reliability (α = .75).

Parental self-efficacy. Participants completed the Parental Self-Efficacy for Promoting Healthy Dietary and Physical Activity Behaviors (Bohman, Rasmussen, & Ghaderi, 2016) scale to assess parental self-efficacy. The self-report scale includes 21 items using a 0 (Not at all Confident) to 10 (Completely Confident) rating scale, with a mid-point anchor of Moderately Confident. The scale measures four subscales: Facilitate Parental Self-Efficacy for Promoting Healthy Dietary Behaviors in Children (e.g., "*How confident are you that you can create a positive atmosphere when having meals with healthy choices?*"), Impede Parental Self-Efficacy for Promoting Healthy Dietary Behaviors in Children (e.g., "*How confident are you that you can get your child to eat healthy foods and drink healthy beverages when your child is acting defiant?*"), Facilitate

Parental Self-Efficacy for Promoting Healthy Physical Activity Behaviors in Children (e.g., "*How confident are you that you can prioritize spending time on taking your child outdoors for physical activity, for example, to a playground or for cycling?*"), and Impede Parental Self-Efficacy for Promoting Healthy Physical Activity Behaviors in Children (e.g., "*How confident are you that you can get your child to be physically active when you are tired, stressed, emotionally upset, or affected by daily hassles?*"). A total score was created by calculating the mean across all items; subscales scores were created by calculating the mean for their respective items. Higher mean scores on each subscale denote greater parental self-efficacy, and the full scale (α = .94) and all subscales demonstrated good reliability (α = .85 to .90).

Self-control. Participants completed the Capacity for Self-Control Scale (Hoyle & Davisson, 2016) to assess individual differences in self-control (e.g., behavioral control). The self-report scale includes 20 items using a 1 (Hardly Ever) to 5 (Nearly Always) rating scale. The scale measures three subscales: Self-Control by Inhibition (e.g., "*I am able to resist temptations*"), Self-Control by Initiation (e.g., "*I waste a lot of time before getting down to work*"), and Self-Control by Continuation (e.g., "*I am able to keep doing what I think I should do, even when other people would stop*"). Eight items were reverse-scored and a total score was created by calculating the mean across all items. Higher mean scores denote greater self-control, and the full scale (α = .92) and all subscales demonstrated good reliability (α = .79 to .89).

Coparenting. Participants completed two subscales, Support (e.g., "*My partner appreciates how hard I work at being a good parent*") and Undermine (e.g., "*My partner* *sometimes makes jokes or sarcastic comments about the way I am as a parent*"), from the Coparenting Relationship Scale (Feinberg, Brown, & Kan, 2012) to assess the coparenting relationship in dual-parent households. The self-report subscales included 12 items using a 0 (Not True of Us) to 6 (Very True of Us) rating scale, with two mid-point anchors 2 (A Little Bit True of Us) and 4 (Somewhat True of Us). The six Undermine items were reverse-scored and a total score was created by calculating the mean across all items. Higher mean scores denote greater support from the coparent, and the full scale ($\alpha = .93$) and subscales demonstrated good reliability ($\alpha = .89$ to $.93$).

Behavioral intentions. Researcher-generated questions were used to assess intention to change behaviors related to dietary intake and physical activity, separately. Participants were presented with two questions gauging whether they intend to change their child's dietary intake (e.g., "*I intend to change my behavior as it relates to my child's nutrition and food intake*") and physical activity (e.g., "*I intend to change my behavior as it relates to my child's physical activity level and opportunities*"), respectively. The self-report items were rated by participants using a 1 (Strongly Disagree) to 7 (Strongly Agree) scale. The two behavioral intention items were used separately as the primary outcomes for present study models.

Parent feeding styles. Participants completed the Caregiver Feeding Styles Questionnaire (Hughes, Power, Fisher, Mueller, & Nicklas, 2005) to assess feeding styles in parents. The self-report scale includes 19 items using a 1 (Never) to 5 (Always) scale. Using a typological approach, two scores were calculated: Demandingness (e.g., "*How often during the dinner meal do you say to the child "Hurry up and eat your food?*") and

Responsiveness (e.g., "*How often during the dinner meal do you encourage the child to eat by arranging the food to make it more interesting (for example, making smiley faces on the pancakes?*"). Demandingness scores were created by calculating the overall mean across all items, while Responsiveness were calculated by dividing the child-centered mean (items 3, 4, 6, 8, 9, 15, and 17) by the Demandingness score; the two subscales demonstrated good reliability (α = .71 to 93). After both scores were calculated, median splits of the two dimensions were conducted and participants were categorized into four groups: Authoritative (high demandingness/high responsiveness), Authoritarian (high demandingness/low responsiveness), Indulgent (low demandingness/high responsiveness), and Uninvolved (low demandingness/low responsiveness). Thirty-two percent of parents in the current sample were categorized as Authoritarian, 32% of parents were categorized as Indulgent, 18% of parents were categorized as Authoritative, and 18% of parents were categorized as Uninvolved.

Child body mass index (BMI). Parents reported child height, weight, biological sex, and date of birth in order to calculate estimates of child BMI. The Centers for Disease Control and Prevention online calculator was used to determine BMI classification (i.e., underweight, healthy, overweight, obese; Centers for Disease Control, 2018). Fifty percent of children were classified as having a healthy BMI, 25% were considered obese, 17% were considered overweight, and 9% were considered underweight. Due to unequal group sizes, a dummy-coded variable was created to compare overweight and obese children to those who were not (0 = not overweight/obese, 1 = overweight/obese).

Covariates. Standard demographic questions included biological sex of the child (0 = female, 1 = male), age of the child, and child fussiness during meal times. Researcher-generated behaviors (e.g., "verbally refuse", "physically refuse") was used to assess child fussiness during meal times, in which participants indicated behaviors their child typically displays during meal times. A total score was achieved by summing across all behaviors, with higher sum scores on denote greater fussiness during meal times.

Analysis Plan

First, I performed a confirmatory factor analysis (CFA) on the latent variable, the ability to enact change, to ascertain indicator loadings and psychometric utility within the present sample. The ability to enact change includes three indicators: parental self-efficacy, self-control, and support from coparent. Second, I conducted a path analysis in a structural equation modeling framework to examine the association between parents' knowledge of nutrition and stress to parents' intentions for changing their child's dietary intake and physical activity levels through the ability to enact change, while controlling for child biological sex, child age, and child fussiness during meal times. The direct association between child BMI and parents' intentions for child dietary intake and physical activity was also assessed in the path analysis. Path analysis allows an assessment of the magnitude and significance among the exogenous (i.e., predictors) and endogenous (i.e., mediators and outcomes) variables included in the model. In addition, path analysis allows for testing direct and indirect effects simultaneously.

A secondary path analysis was performed to examine whether the direct effect of the ability to enact change on intentions for child dietary intake varied based on parents' feeding styles (i.e., uninvolved, indulgent, authoritarian, and authoritative). Using a multiple group analysis, I estimated a baseline model with all paths freely estimated across groups followed by a fully constrained model (i.e., all paths constrained to be equal across groups; Muthen & Muthen, 1998-2013). If the fully-constrained model fit the data significantly worse than the baseline model, I introduced constraints on individual paths.

All analyses were conducted in Mplus version 7.11 (Muthen & Muthen, 1998-2013) because of its ability to address missing data. All descriptive statistics were generated in SPSS version 24 (IBM, 2016). The present data set includes some missing data; however, the full information maximum likelihood (FIML) method in Mplus was used, allowing data for all cases to be included in model estimations (Enders, 2011). Nonparametric resampling procedures (Preacher & Hayes, 2008) with 2,000 bootstraps were used to determine mediation effects inferred from the path analysis. All inferences of indirect effects were based on the Mplus estimation of indirect effects, which estimates indirect effects with delta method standard errors (Muthen & Muthen, 1998-2013). To examine the moderating effect of parent feeding styles, a multiple group analysis was conducted using the GROUP command in Mplus, which computes parameter estimates based on the individual groups.

The fit of the model was evaluated using four widely used criteria. Chi-square values and level of significance was used as an indicator of fit; a p-value greater than .05 suggest the model fits the data well. The comparative fit index (CFI; Bentler, 1990), which indicates the improvement in fit of the specified model compared to the baseline model; values greater than .90 and greater suggest the model fits the data well. The root mean square error of approximation (RMSEA; Steiger & Lind, 1990) indicates the degree of misspecification in a model per degrees of freedom, with small values (.00 to .08) indicating acceptable fit (Browne & Cudek, 1993). Finally, the standardized root mean square residual (SRMR; Hu & Bentler, 1999) is a measure of the mean absolute covariance residual (i.e., the difference between observed and predicted covariances), with small values (close to 0) indicating acceptable fit. To compare model fit, two additional criteria were used: Akaike's Information Criterion (AIC; Akaike, 1987) and Bayesian Information Criterion (BIC; Raftery, 1995); smaller values indicate better fit to the data.

Results

Descriptive Statistics

Table 2 presents Pearson's correlations between the stress, nutrition knowledge, parental self-efficacy, self-control, support from coparent, child BMI, child characteristics, and intentions for child dietary intake and physical activity. Stress was negatively correlated with parental self-efficacy (r = -.36, p < .001), self-control (r = -.63, p < .001) and support from coparent (r = -.25, p < .001), and positively correlated with child BMI (r = .14, p < .05) , child fussiness during meal times (r = .20, p < .001), intentions for child dietary intake (r = .17, p < .01), and intentions for child physical activity (r = .13, p < .05). Parental self-efficacy was positively correlated with self-control (r = .44, p < .001) and support from coparent (r = .20, p < .001), and negatively correlated with child fussiness during meal times (r = -.29, p < .001). Self-control was positively correlated with support from coparent (r = .28, p < .001), and negatively correlated with child BMI (r = .14, p < .05), child fussiness during meal times (r = -.27, p < .05), and intentions for child dietary intake (r = -.14, p < .05). Support from coparent was negatively associated with child fussiness during meal times (r = -.13, p < .05). Child BMI was positively correlated with intentions for child dietary intake (r = .13, p < .05) and intentions for child physical activity (r = .13, p < .05). Child fussiness during meal times was positively correlated with child biological sex (r = .12, p < .05) and negatively correlated with child age (r = -.12, p < .001). Intentions for child dietary intake was positively associated with child fussiness during meal times (r = .14, p < .05) and intentions for child physical activity (r = .58, p < .001). Nutrition knowledge was not significantly correlated with any predictors, covariates, or outcomes.

Measurement Model

The fit of the measurement model could not be tested because exactly three exogenous variables defined the latent construct of the ability to enact change (Kline, 2015). However, an examination of the standardized factor loadings indicates acceptable to adequate loadings ranging from .36 to .79 (p < .001). The proportion of variance explained for each indicator by the latent construct ranges from 13% to 62%, meaning the latent construct is explaining little to a moderate amount of variance in its indicators. The measurement model is illustrated in Figure 2. Although loadings above .32 could be considered acceptable (Comrey & Lee, 1992), the support from coparent loading of .36 is considerably lower than the two remaining indicators. Thus, it is questionable whether support from coparent should be included in the latent construct.

Path Analysis

Hypothesized model. The full structural model is illustrated in Figure 3. The fit statistics for the structural model indicate adequate to acceptable model fit, $\chi^2(20)$ = 41.73, p < .01, RMSEA = .06 [.03 .08], CFI = .95, SRMR = .04. A significant chi-square value may suggest that the model does not provide the best account of the data. However, when considering all fit statistics together, this model could be considered adequate to acceptable. Table 3 provides model fit statistics for the hypothesized and alternative models.

As seen in Figure 3, parents' stress was negatively associated with the ability to enact change ($\beta = -.72$, $p < .001$) and marginally positively associated with intentions for child physical activity ($\beta = .18$, $p < .08$). Parents with greater stress tend to be less able to enact change but indicate having an intention to change their child's physical activity levels. Additionally, there was a marginal, positive association between child BMI and intentions for child dietary intake ($\beta = .11$, $p < .08$) and child physical activity ($\beta = .11$, $p < .08$). In other words, parents with an overweight or obese child indicated greater intentions to change their child's dietary intake and physical activity levels. Child weight status may serve as a cue to parents that there is an issue with their child's physical health and prompt parents to set intentions to change what they feed their children and how much physical activity their child engages in.

Nutrition knowledge did not have a direct effect on the ability to enact change or intentions to change their child's dietary intake or physical activity levels, while the ability to enact change did not have a direct effect on intentions to change their child's dietary intake or physical activity levels. No significant indirect effects emerged for the relation between parent stress and nutrition knowledge to intentions through the ability to enact change. Indirect effects were estimated in Mplus using the Delta method and robust standard errors, which are presented in Table 4.

Overall, the model accounts for 53% of the variance in the ability to enact change (i.e., parental self-efficacy, self-control, coparenting, stress, and nutrition knowledge). The model accounts for nearly 7% of the variance in intentions for child dietary intake (i.e., stress, nutrition knowledge, ability to enact change, child BMI) and 6% of the variance in intentions for child physical activity (i.e., stress, nutrition knowledge, ability to enact change, child BMI); however, the *R*-squared value for intentions for child physical activity was marginal ($p < .08$). *R*-squared values of this small magnitude suggest that the predictors in this model, namely stress, nutrition knowledge and the ability to enact change, fail to explain parents' intentions for child dietary intake and physical activity. This may also suggest that additional constructs are required for understanding and explaining the basis of parents' intentions for changing what they feed their children and how much physical activity their child gets.

Moderating role of parent feeding styles. Results indicate no significant group differences in the associations of the ability to enact change and intentions for child dietary intake and physical activity, χ^2 (92) = 145.75, $p < .001$. Thus, further constraints on individual pathways is not required. Moderated effects were estimated in Mplus using a two-step approach: 1) all parameters freely estimated; 2) parameters of interest constrained to be equal. Table 5 provides chi-square difference tests for the hypothesized and alternative models.

Alternative model. Figure 4 depicts an alternative model linking parent stress, nutrition knowledge, and support from coparent to intentions for child dietary intake and child physical activity through parental self-efficacy and self-control. The hypothesized model examined how the ability to enact change mediated the relationship between parent stress and nutrition knowledge with intentions for child dietary intake and child physical activity. However, when considering the latent variable, it could be argued that support from coparent does not fit within the ability to enact change. Support from coparent demonstrated a loading of .36, which is considerably lower than parental self-efficacy and self-control. Thus, the alternative model assessed whether support from coparent, parent stress, and nutrition knowledge was linked to parental self-efficacy and self-control, and in turn, were linked to intentions for child dietary intake and child physical activity, while controlling for child biological sex, child age, and child fussiness during meal times. As in the hypothesized model, the direct association between child BMI and parents' intentions for child dietary intake and physical activity. Further, a secondary path analysis will be conducted to determine whether the direct effects of parental self-efficacy and self-control on parents' intentions varies based on parents' feeding styles. Path analysis in a structural equation modeling framework was used to examine these associations and a multiple group analysis was used to determine the presence of moderation.

The alternative model provided adequate to poor model fit, χ^2 (9) = 54.99, $p <$ .001, RMSEA = .13 [.09 .16], CFI = .89, SRMR = .04. A significant chi-square value (Kline, 2015), RMSEA value greater than .08 and RMSEA confidence interval that exceeds .10 (Browne & Cudek, 1993) suggests that the model does not provide the best account of the data. A CFI value of .89 suggests that it is questionable whether the model fits the data well but could still be considered acceptable. However, when considering all fit statistics together, this model should be interpreted with caution. Table 3 provides model fit statistics for the hypothesized and alternative models.

As seen in Figure 4, parents' stress was negatively associated with parental self-efficacy (β = -.33, $p < .001$) and self-control (β = -.60, $p < .001$), and positively associated with intentions for child dietary intake (β = .14, $p < .05$) and child physical activity (β = .14, $p < .05$). Parents with greater stress tend to be feel less efficacious and having less control over their behaviors but indicate having an intention to change their child's dietary intake and physical activity levels. Nutrition knowledge was only marginally negatively associated with self-control (β = -.09, $p < .08$), such that parents with more nutrition knowledge report having less control over their behaviors. Support from coparent was positively associated with parental self-efficacy (β = .12, $p < .05$) and self-control (β = .13, $p < .05$). Parents with greater support from their coparent tend to feel more efficacious and report having more control over their behaviors. Parental self-efficacy was marginally positively associated with intentions for child dietary intake (β = .11, $p < .08$). Parents with greater self-efficacy indicate having intentions to change their child's dietary intake. Child BMI was positively associated with intentions for child dietary intake (β = .12, $p < .08$) and child physical activity (β = .12, $p < .08$). If their child is overweight or obese, parents were more likely to have an intention to change their child's dietary intake and physical activity levels.

Nutrition knowledge did not have a direct effect on parental self-efficacy or intentions to change their child's dietary intake or physical activity levels, while support from coparent did not have a direct effect on intentions to change their child's dietary intake or physical activity levels. No significant indirect effects emerged for the relation between parent stress, nutrition knowledge, and support from coparent to intentions through parental self-efficacy and self-control. Indirect effects were estimated in Mplus using the Delta method and robust standard errors, which are presented in Table 4.

Overall, the model accounts for 42% of the variance in parents' self-control (i.e., stress, nutrition knowledge, and support from coparent). The model accounts for nearly 14% of the variance in parental self-efficacy (i.e., stress, nutrition knowledge, and support from coparent), 9% of the variance in intentions for child dietary intake (i.e., stress, nutrition knowledge, and support from coparent, parental self-efficacy, self-control, child BMI), and 6% of the variance in intentions for child physical activity (i.e., stress, nutrition knowledge, and support from coparent, parental self-efficacy, self-control, child BMI). The proportion of variance explained in the alternative model is comparable to the hypothesized model, such that the predictors in this model fail to explain parents' intentions for child dietary intake and physical activity, and additional constructs are required for understanding and explaining the basis of parents' intentions.

Moderating role of parent feeding styles. Results indicate no significant group differences in the associations of parental self-efficacy and self-control with intentions for child dietary intake, $\chi^2(36) = 65.44$, $p < .01$. Thus, further constraints on individual pathways is not required. Moderated effects were estimated in Mplus using a two-step approach: 1) all parameters freely estimated; 2) parameters of interest constrained to be equal. Table 5 provides chi-square difference tests for the hypothesized and alternative models.

Compared to the hypothesized model, the alternative model appears to fit the data less well. Using traditional fit criteria, the hypothesized model ($\chi^2(20) = 41.73$, RMSEA = .06 [.03 .08], CFI = .95, SRMR = .04) appears to provide a better account of the data than the alternative model ($\chi^2(9) = 54.99$, RMSEA = .13 [.09 .16], CFI = .89, SRMR = .04). The alternative model provides some support for the original placement of the study constructs: stress and nutrition knowledge → ability to enact change → intentions for child dietary intake and physical activity. Table 5 provides model fit results for the hypothesized and alternative models.

Discussion

This study examined the effects of stress and nutrition knowledge on parents' intentions for child dietary intake and physical activity, the mediating role of parents' abilities to engage in healthful behaviors, and the moderating role of parent feeding styles on the association between parents' abilities and intentions. The findings are somewhat consistent with previous research showing direct effects of stress on abilities to engage in healthful behaviors (Padden et al., 2011) and intentions to engage in healthful behaviors (Marzec et al., 2013). Neither nutrition knowledge nor the ability to enact change had direct or indirect effects on parents' intentions for child dietary intake and physical activity. Further, parent feeding styles did not moderate the link between parents' ability to enact change and intentions for child dietary intake. Although the mediation and moderation hypotheses were not supported, this study highlights the role of stress on parents' perceived abilities to engage in healthful behaviors and parents' intentions for wanting to change their child's diet and physical activity levels.

The present study provided support for the role of contextual factors, such as stress, in affecting parents' abilities to enact change (e.g., parental self-efficacy, self-control, and support from coparent) and their intentions to change their child's physical activity levels (however, this latter association was marginal). Parents with greater levels of stress had diminished perceptions of their abilities but indicated greater intentions to change their child's physical activity levels. Regarding perceived abilities, prior research has documented the adverse effects of stress on parenting competency (Jones & Prinz, 2005). Yet, the positive association between stress and parents' intentions is paradoxical, such that higher stress is related to greater intentions. Stress has been shown to inhibit parents from prioritizing healthful dietary intake and physical activity (Norman, Berlin, Sundblom, Elinder, & Nyberg, 2015). Additionally, parents' stress has been linked to having less healthy food environments (Bauer, Hearst, Escoto, Berge, & Neumark-Sztainer, 2012; Devine, Jastran, Jabs, Wethington, Farell, & Bisogni, 2006), less time engaging in physical activity with their child (Roos, Sarlio-Lahteenkorva, Lallukka, & Lahelma, 2007), and less time to prepare healthy meals and eat as a family (Slater, Sevenhuysen, Edginton, & O'Neil, 2012). However, parents' stress has also been linked to promoting child health, such that parents with greater stress are more engaged and actively monitoring their child's health (Helgeson, Becker, Escobar, & Siminerio, 2012). This evidence may suggest a parabolic association between parents' stress and intentions. When stress is low or high, parents' may be more likely to set intentions. For example, parents with greater stress may be more alert to potential health issues affecting their child and express concern regarding their child's health. However, the link between stress and parents' intentions is less established because the majority of research has focused on the effects of stress on parents' behaviors rather than their intentions.

The Theory of Planned Behavior (Ajzen, 1985, 1991) posits that knowledge is a determinant of attitudes, norms, and perceived behavioral control, and in turn, attitudes, norms, and perceived behavioral control are determinants of intentions. The present study examined the direct and indirect effects of nutrition knowledge on parents' intentions through their ability to enact change. The ability to enact change was conceived as a multi-dimensional construct that mirrors "perceived behavioral control" in the Theory of

Planned Behavior, which encompassed parental self-efficacy, self-control, and support from their coparenting partner. Previous research suggests that self-efficacy, self-control (or self-regulation), and social support are facilitators of actual behavior (Anderson, Winett, & Wojcik, 2007). Specifically, higher levels of self-efficacy, self-regulatory strategies, and social support were linked to reduced fat consumption, increased fiber intake, and increased fruit and vegetable intake. While this evidence provides some support for the construction of the ability to enact change, no direct or indirect effects on parents' intentions emerged when using the ability to enact change. Future research should incorporate additional predictors of parents' intentions – such as attitudes and norms associated with child dietary intake and physical activity levels.

The link between nutrition knowledge and intentions to change child dietary intake is unclear. To my knowledge, little to no studies have examined the association between parents' nutrition knowledge and intentions to change what or how their children eat. The majority of prior research has focused on parents' nutrition knowledge and their child's dietary intake (Peters, Dollman, Petkov, & Parletta, 2012). Increased nutrition knowledge has been linked with reduced fat consumption (Colavito et al., 1996), increased fruit intake (Gibson, Wardle, & Watts, 1998), and increased fiber intake in children (Gibson et al., 1998; Variyam, Blaylock, Lin, Ralston, & Smallwood, 1998). However, when considering whether parents have intentions to change what or how they feed their children, there is a dearth of research to expound on. It could be argued that parents may only have intentions to change what or how they feed their children if their child is overweight or obese, regardless of their level of nutrition knowledge. However, child BMI was included as a predictor of parents' intentions in the present study and no significant effect of parents' nutrition knowledge emerged. This may suggest that additional constructs are required to understanding parents' intentions to change their child's dietary intake.

To examine possible alternative explanations, a second path analysis assessed whether support from the coparent better served as an independent predictor of parents' intentions alongside nutrition knowledge and stress, rather than being used in the ability to enact change. Modeling latent variables requires at least three exogenous variables (Kline, 2015) – thus, the ability to enact change could not be modeled in the second path analysis. The remaining variables, parental self-efficacy and self-control, were used as observed variables predicting parents' intentions. Compared to the hypothesized model, this alternative ordering of the variables yielded somewhat different findings. Support from coparent was positively associated with parental self-efficacy and self-control, but not with parents' intentions for child dietary intake and physical activity. Previous research suggests that the perception of support from others appears to be important for parents' perceived competencies (e.g., self-efficacy; Feinberg, Brown, & Kan, 2012), but not necessarily their intentions for child dietary intake and physical activity. Parental self-efficacy was positively associated with parents' intentions for child dietary intake (this association was marginal), but not for intentions for physical activity. In line with Anderson and colleagues (2007) findings, parental self-efficacy may be associated with parents' subsequent behavior (i.e., what their child consumes) through their intentions to change their child's dietary intake. Self-control (or self-regulation) was not associated with parents' intentions for child dietary intake and physical. In general, self-regulatory processes, such as inhibitory control, have been linked to overeating (Guerrieri et al., 2007; Jasinska et al., 2012) and risk for overweight and obesity (see Dohle, Diel, & Hofmann, 2017).

The link between parents' ability to enact change and intentions for changing child dietary intake was not moderated by parent feeding styles. Previous research suggests that parenting competency is associated with what parents feed their children. For example, efficacious parents feed their children higher quality diets and fewer unhealthy snacks (Parekh et al., 2018), reduced sugary drink consumption (Wright et al., 2014), and increased fruit and vegetable intake (Ice et al., 2014). The degree to which parenting competencies determine subsequent behavior could be affected by parenting style (Jones & Prinz, 2005). However, the present study failed to demonstrate a moderating effect of parent feeding styles. Two possible reasons for the lack of detection may be due to the measure of parenting style and small, unequal subgroups. First, a domain-specific measure of parenting styles, namely parent feeding styles, was used to examine strategies that parents employ during meal times. Due to the domain-specificity of feeding, it did not make sense to have parent feeding styles moderate the link between parents' abilities to enact change and intentions for child physical activity. Perhaps using a measure of general parenting style would have been more appropriate to assess parents' general behaviors as a moderator of the association of interest. Second, the total sample size and subgroup breakdown could affect model estimation. It is generally recommended that each group include 200 members to detect moderation (Kenny, 2011). The present study had a total of 329 parents, with a subgroup breakdown of 58 parents in the Uninvolved group, 60 parents in the Authoritative group, 104 parents in the Indulgent group, and 106 parents in the Authoritarian group. Thus, in order to detect moderation, it would be optimal to increase the sample size and ultimately subgroup membership.

Strengths and Limitations

The primary strength of the present study is theoretical integration used to develop the conceptual model. Existing theories of health behavior do not account for the unique challenges that parents may face when trying to change their child's health. In line with Sameroff's (2009) suggestion of theory integration, incorporating elements from both theoretical domains (i.e., developmental science and health psychology) will shift towards a more unified and dynamic way of understanding the role of parenting on child health outcomes. For example, the present study utilizes constructs and processes from the Bioecological Model (Bronfenbrenner & Morris, 1998, 2006), Determinants of Parenting (Belsky, 1984), Health Belief Model (Hochbaum, 1958; Rosenstock, 1960, 1974), Theory of Reasoned Action (Fishbein, 1967; Fishbein & Ajzen, 1975), Theory of Planned Behavior (Ajzen, 1985, 1991), Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992), Precaution Adoption Process Model (Weinstein, 1988; Weinstein & Sandman, 1992), and Health Action Process Approach (Schwarzer, 2008). The full conceptual model is available in Supplemental Materials.

In line with the primary strength, a secondary strength reflects the range of measures collected. Stress and nutrition knowledge were used as predictors of parents' abilities (e.g., parental self-efficacy, self-control, and support from coparent) and their intentions to change their child's dietary intake and physical activity levels. In addition, parent-reported child effects (e.g., BMI and fussiness during meal times) were included in both path analysis models.

There are some limitations to this study that should be taken into account. First, the proportion of variance explained in the primary outcomes (i.e., intentions for child dietary intake and physical activity) was small (e.g., $R^2 < 10\%$). This suggests that the constructs in the models are not explaining a large amount of variability in parents' intentions to change their child's dietary intake or physical activity levels. Additional constructs are required to understand what determines parents' intentions to engage in healthful behaviors. For example, the Theory of Planned Behavior (Ajzen, 1985, 1991) includes attitudes, norms, and behavioral control as predictors of intentions – thus, future research should include additional predictors of intentions to account for a greater proportion of variance.

Second, the data utilized in the present study are cross-sectional in nature, which limits causal inferences. Future research should evaluate parents' abilities, intentions, and subsequent behavior longitudinally to observe whether initial levels or changes in parents' abilities are related to later behavior through their intentions. Examining these relations longitudinally is in line with theories of health behavior change, such as the Theory of Planned Behavior (Ajzen, 1985, 1991), the Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992), and the Health Action

Process Approach (Schwarzer, 2008), which include intentions as an intermediate outcome and/or predictor of later behavior.

Third, all measures were self-reported by parents, which may be biased or inaccurate (Akinbami & Ogden, 2009). In this vein, only one parent reported information about their child, which could also produce bias. It could be useful to incorporate a multi-method, multi-informant approach to gather information from both parents, observed measures of parenting and feeding, and objective anthropometric data (i.e., BMI).

Fourth, nutrition knowledge was largely unrelated to the central constructs in the present study. This could be a product of the measure used; for example, the present study utilized the Consumer Nutrition Knowledge Scale (Dickson-Spillman, Siegrist, & Keller, 2011), which assesses consumers' knowledge of nutrition. This measure was selected due to its brevity and criterion validity with the General Nutrition Knowledge Questionnaire (Parmenter & Wardle, 1999), which is the most commonly used measure of nutrition knowledge. However, the Consumer Nutrition Knowledge Scale (Dickson-Spillman, Siegrist, & Keller, 2011) is less widely used and has not been validated to the extent that the General Nutrition Knowledge Questionnaire (Parmenter & Wardle, 1999) has. Future research should consider utilizing both measures of nutrition knowledge to examine possible differential effects on desired outcomes.

Fifth, the sample characteristics limit generalizability to the population at large. Parents in this study were predominately married, educated, White women. The children associated with this sample may be at less risk for developing obesity, compared to children from diverse backgrounds (Ogden et al., 2018). For example, the incidence of obesity is lower for children in educated households (9.6% college vs. 21.6% high school or less) and lower for children in the highest income group (10.9% highest vs. 18.9% lowest). Including participants from diverse backgrounds could help increase variability in responses and ultimately generalizability of the results.

Conclusion

The present study investigated several pathways of a new theoretical model for understanding how parents engage in health behavior change related to their child's dietary intake and physical activity levels. The findings suggest that parents' stress is important for parents' perceived competencies (e.g., self-efficacy, self-control, and having support) and their intentions to engage in healthful behaviors. Alternatively, parents' nutrition knowledge was largely unassociated with the study constructs (e.g., competencies, intentions). These findings support previous research on the role of stress in inhibiting parents' competencies and ability to engage in healthful behaviors, while links between nutrition knowledge and parents' intentions to engage in healthful behaviors is unclear. Future research should examine additional constructs used in health behavior theories, such as attitudes and norms, to determine what predicts parents' intentions to engage in healthful behaviors and ultimately parents' actual healthful behaviors. Nevertheless, for promoting health and prevention of childhood obesity, the unification of developmental and health theories is necessary for understanding why parents make intentions to engage in healthful behaviors, what facilitates (or impedes) parents from engaging in healthful behaviors, and how parents maintain healthful behaviors.

Tables

Table 1

Demographic Indicators of Study Participants (n = 329)

Variable	*n*	Frequency (%)	*M*	*SD*
Parent Age	329		33.84	5.68
Parent Sex				
Male	83	25%		
Female	246	75%		
Parent Race/Ethnicity				
Caucasian/White	254	78%		
African American/Black	24	7%		
Asian American/Asian	19	6%		
Hispanic/Latino	19	6%		
Native American/Alaska Native	1	0.30%		
Bi- or Multi-Ethnic	9	3%		
Other	1	0.30%		
Parent Education				
Some or All High School	39	12%		
Some College	64	20%		
Associate’s Degree	48	15%		
Bachelor’s Degree	120	37%		
Advanced Degree	56	17%		
Marital Status				
Married	245	75%		
Living with Partner	46	14%		
Dating	13	4%		
Single	9	3%		
Divorced/Separated	13	4%		
Other	1	0.30%		
Parent Feeding Styles				
Uninvolved	58	18%		
Indulgent	104	32%		
Authoritarian	106	32%		
Authoritative	60	18%		
Child Age[a]	329		5.1	1.74
Child Sex[a]				
Male	171	52%		
Female	158	48%		
Child BMI				
Not Overweight/Obese	140	58%		
Overweight/Obese	100	42%		

Note. [a] These variables were included as covariates in the models. Proportions may exceed 100% due to rounding.

Table 2

Correlations, Means, and Standard Deviations for Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
Predictors											
1. Stress	1										
2. Nutrition Knowledge	-.01	1									
3. Parental Self-Efficacy	-.36***	.04	1								
4. Self-Control	-.63***	-.08	.44***	1							
5. Support from Coparent	-.25***	.003	.20***	.28***	1						
6. Child BMI (1 = overweight/obese)	.14*	.03	-.09	-.14*	-.07	1					
Covariates											
7. Child Sex (1 = male)	.01	.02	-.02	.003	.05	-.02	1				
8. Child Age	-.08	-.08	-.002	.07	-.07	-.11	-.09	1			
9. Child Fussiness	.20***	-.02	-.29***	-.27***	-.13*	-.003	.12*	-.21***	1		
Outcomes											
10. Intentions for Dietary Intake	.17**	-.07	-.01	-.14*	-.02	.13*	.-.10	.03	.14*	1	
11. Intentions for Physical Activity	.13*	-.06	.02	-.05	-.01	.14*	-.07	-.06	.101	.58***	1
M	1.76	13.37	6.63	3.51	5.76	.42	.52	5.10	2.31	4.91	5.13
(*SD*)	(.60)	(3.54)	(1.53)	(.56)	(1.24)	(.49)	(.50)	(1.74)	(1.24)	(1.49)	(1.42)
α	.91	.75	.94	.92	.93	--	--	--	--	--	--

Note. ***$p < .001$, **$p < .01$, *$p < .05$. α = Cronbach's alpha.

Table 3

Model Fit Results for the Hypothesized Model and Alternative Model

Indicator	Model	
	Hypothesized Model	Alternative Model
χ^2	41.73**	54.99***
DF	20	9
RMSEA	.06 [.03 .08]	.13 [.09 .16]
CFI	.95	.89
SRMR	.04	.04

Note. DF = Degrees of freedom; RMSEA = Root Mean Square Error Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Square Residual. ***$p < .001$, **$p < .01$.

Table 4
Tests of Mediation for Path Analysis Models

Path	Mplus Estimate of Indirect Effects			
	Indirect	95% CI	Direct	Total
Hypothesized Model				
Stress → Ability to Enact Change → Intentions for Dietary Intake	-.02	-.19, .16	.15	.13
Stress → Ability to Enact Change → Intentions for Physical Activity	-.09	-.28, .07	.18	.09
Nutrition Knowledge → Ability to Enact Change → Intentions for Dietary Intake	-.002	-.03, .02	-.07	-.07
Nutrition Knowledge → Ability to Enact Change → Intentions for Physical Activity	-.01	-.04, .01	-.06	-.07
Alternative Model				
Stress → Parental Self-Efficacy → Intentions for Dietary Intake	-.04	-.08, .01	.14	.14
Stress → Parental Self-Efficacy → Intentions for Physical Activity	-.03	-.08, .01	.14	.09
Stress → Self-Control → Intentions for Dietary Intake	.04	-.05, .13	.14	.14
Stress → Self-Control → Intentions for Physical Activity	-.02	-.11, -.07	.14	.09
Nutrition Knowledge → Parental Self-Efficacy → Intentions for Dietary Intake	.004	-.01, .02	-.08	-.07
Nutrition Knowledge → Parental Self-Efficacy → Intentions for Physical Activity	.004	-.01, .02	-.07	-.06
Nutrition Knowledge → Self-Control → Intentions for Dietary Intake	.01	-.01, .02	-.08	-.07
Nutrition Knowledge → Self-Control → Intentions for Physical Activity	-.003	-.02, .01	-.07	-.06
Support from Coparent → Parental Self-Efficacy → Intentions for Dietary Intake	.013	-.003, .04	.04	.04
Support from Coparent → Parental Self-Efficacy → Intentions for Physical Activity	.01	-.003, .03	.02	.04
Support from Coparent → Self-Control → Intentions for Dietary Intake	-.01	-.03, .01	.04	.04
Support from Coparent → Self-Control → Intentions for Physical Activity	.004	-.02, .03	.02	.04

Note. All paths were non-significant.

Table 5

Tests of Moderation for Path Analysis Models

Model	Indicator	
	χ^2	DF
Hypothesized Model		
Unconstrained	145.75***	92
Constrained	153.42***	95
Model Difference Test	$\Delta\chi^2$ (3) = 7.67	
Alternative Model		
Unconstrained	65.44**	36
Constrained	85.80***	43
Model Difference Test	$\Delta\chi^2$ (7) = 20.35**	

Note. $\Delta\chi^2$ = Change in chi-square value. ***p < .001, **p < .01.

Figures

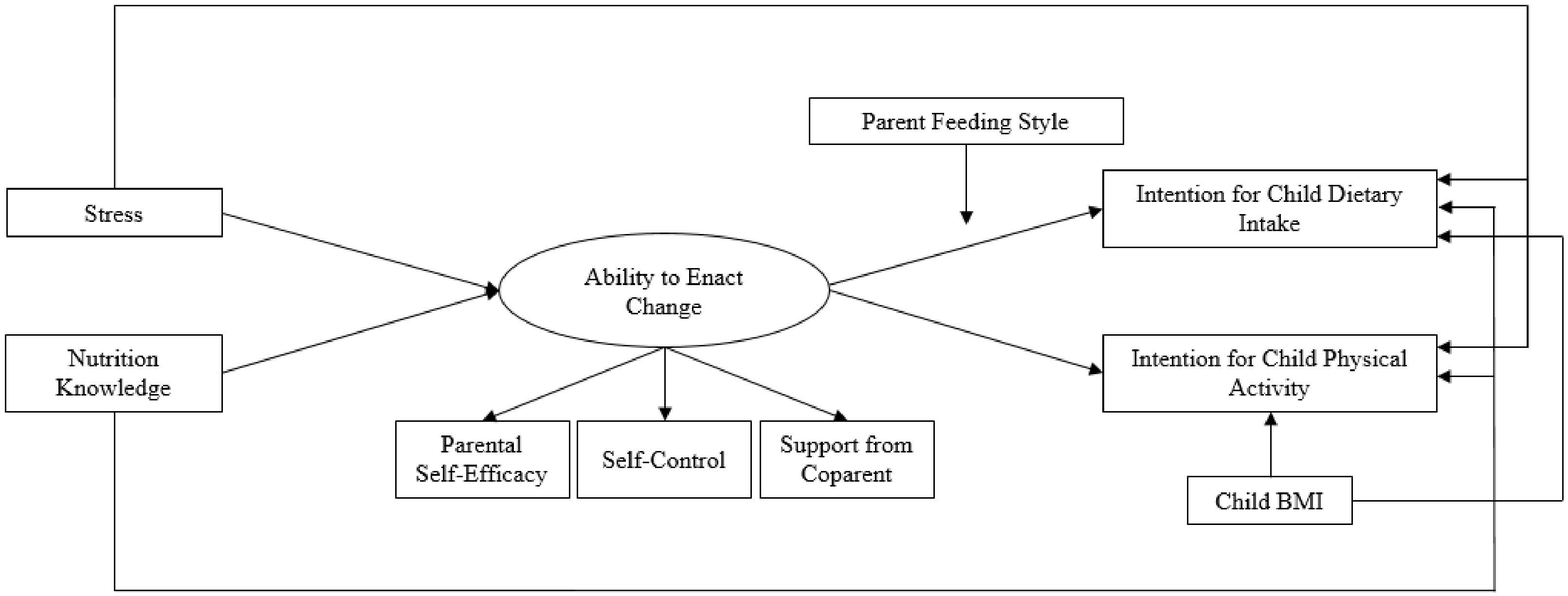

Figure 1. Conceptual model linking stress, nutrition knowledge, ability to enact change, parent feeding styles, child BMI, intentions for child dietary intake and intentions for child physical activity.

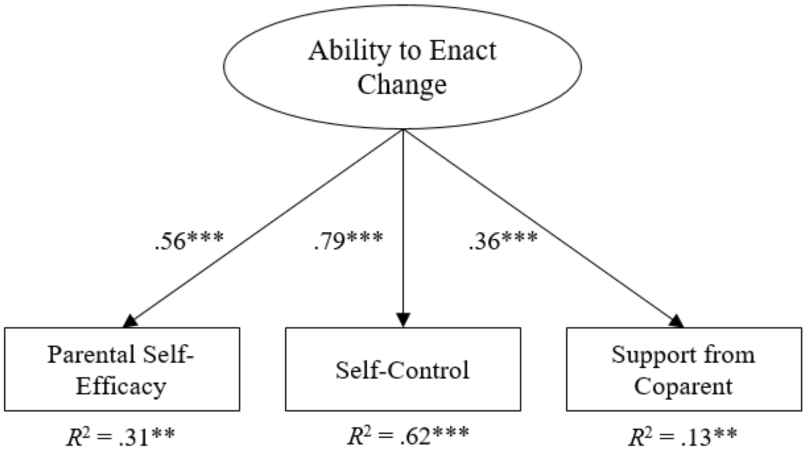

Figure 2. Measurement model for the latent variable, ability to enact change. ***$p < .001$, **$p < .01$

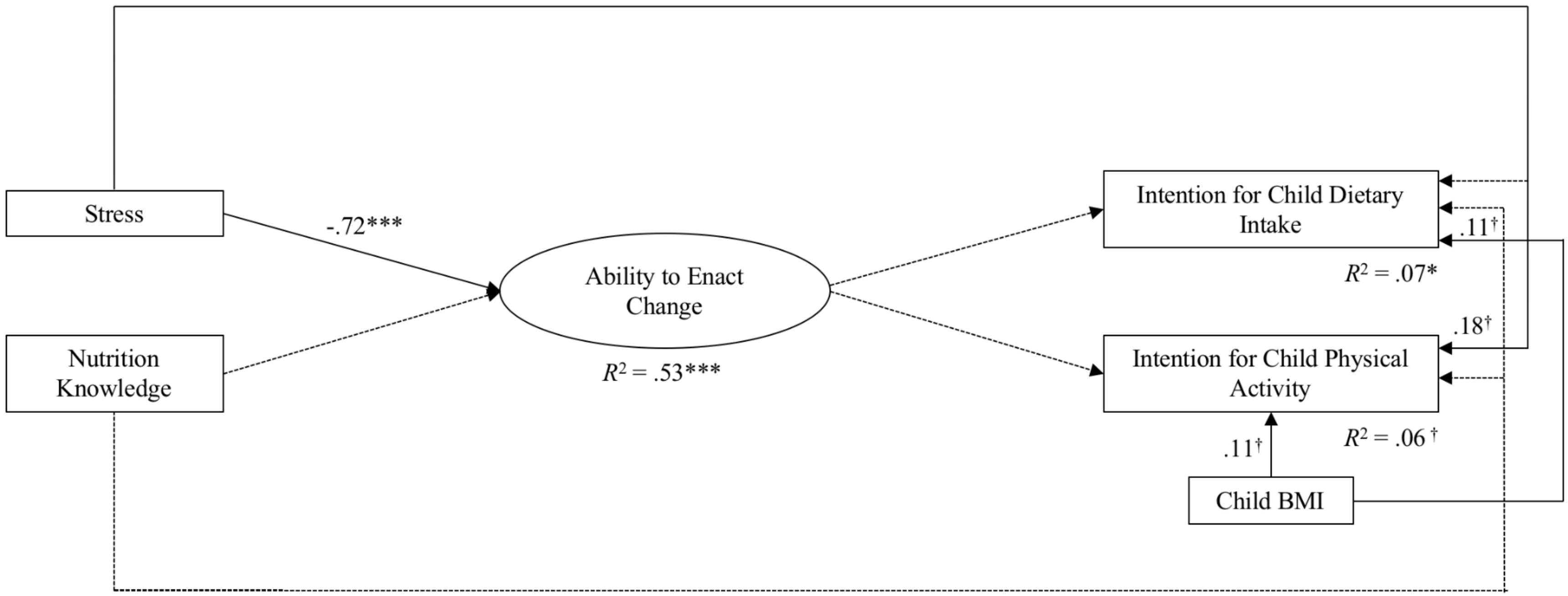

Figure 3. Results for the hypothesized model path analysis. Standardized coefficients for the hypothesized model are shown on the arrows. Dashed lines indicate non-significant paths. *R*-squared values indicate the amount of variance being explained for each endogenous variable by the model. ***$p < .001$, **$p < .01$, *$p < .05$, †$p < .08$. Child age, biological sex, and fussiness during meal times were included as covariates.

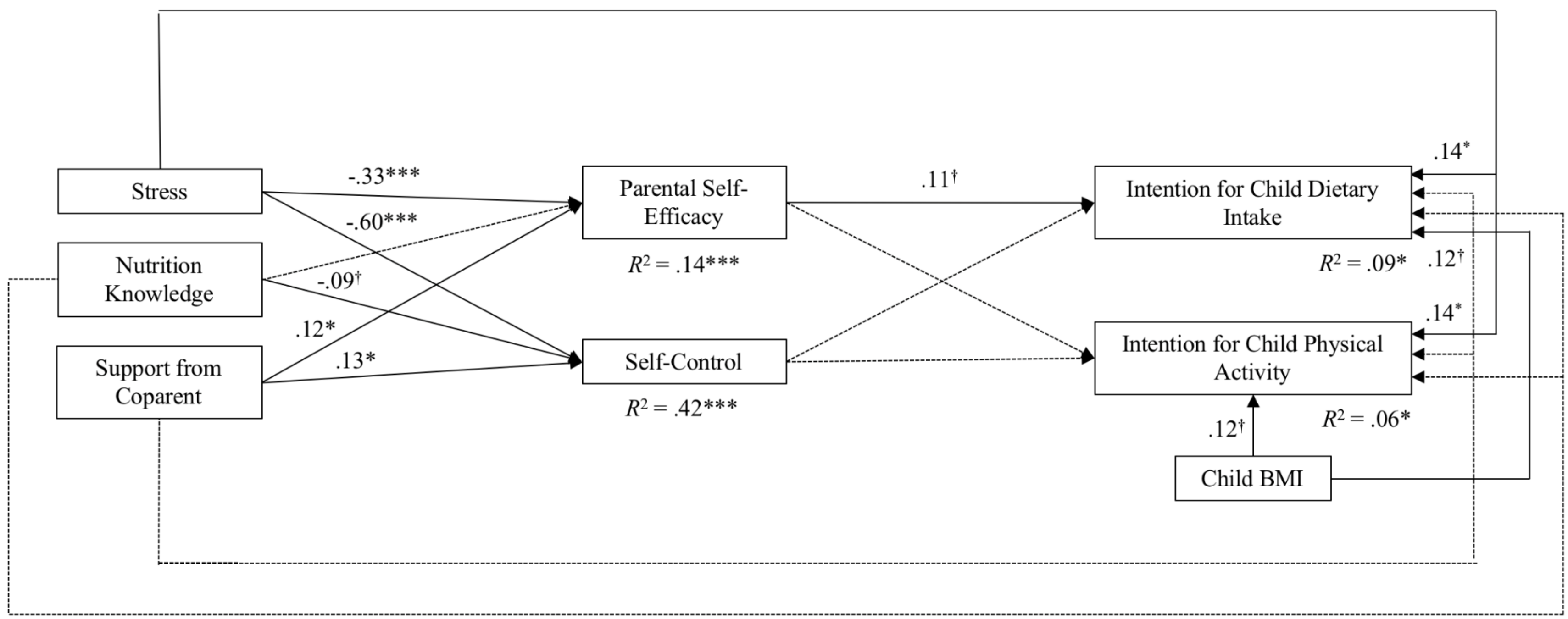

Figure 4. Results for the alternative model path analysis. Standardized coefficients for the alternative model are shown on the arrows. Dashed lines indicate non-significant paths. *R*-squared values indicate the amount of variance being explained for each endogenous variable by the model. ***$p < .001$, **$p < .01$, *$p < .05$, †$p < .08$. Child age, biological sex, and fussiness during meal times were included as covariates.

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